CASE

# Lab Report Template

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**Problem 7.3.5. Separating Oil and Water**

## Problem

How can you separate oil and water when there is 25% oil and 75% water of a 400 ml mixture to obtain at least 100 ml of clean water?

## Background Knowledge

Oil is less dense than water, causing them to be immiscible.

## Hypothesis

The oil and water will separate using a pipette and various sizes of graduated cylinders to create gradually smaller areas to remove oil from, then using a filtering process.

## Materials

All are common materials and lab equipment

- Three 100 mL graduated cylinders
- Large beaker (1000 mL)
- 200 mL beaker
- Disposable pipets
- Coffee filters
- Plastic funnel

## Procedures

1. Allow oil/water mixture time to separate for a few minutes.
2. Begin pouring oil off the top from the 500 mL beaker and place in the 200 mL oil beaker.
3. Once no more oil can be poured from the top, pour mixture into 100 mL graduated cylinder and begin using pipette to remove oil from the top layer.
4. When graduated cylinder is full, place into 1000 mL beaker and continue adding water from initial beaker. This allows the oil from the top to flood over.
5. Place a coffee filter in a plastic funnel. Set this in the top of a 25 mL graduated cylinder.
6. Pour remaining mixture through the funnel and 100 mL should come out clean. If not, filter again with a clean coffee filter.

## Data Collection

In our procedure, we saw that the multi-step process will remove all of the oil from the water. Towards the end of the experiment, we had very small amounts of oil left in the mixture, and we then used the coffee filters. After

seeing how well those worked, if this experiment was done again, we could try using the coffee filters much sooner in the procedure.

## Analysis of Results

The mechanical method of pouring off the oil as it separated to the top of the beaker was largely successful as a first method. this is a general practice in the oil boom clean up methods--this is why it is used in industry. to further remove the small droplets, we would have used copper sulfate if it was available because that would have attracted the oil molecules and removed it from the water. Since we did not have that, we used the coffee filter to separate the mixture. Using the density to watch the water go through the filter more quickly than the oil as the oil wanted to adhere to the filter, we pulled the graduated cylinder from collection as soon as the oil and water were mixing. In industry, they would use the mechanical oil boom method first and then finish with an oil dispersant lastly that would have the effect of blasting the oil particles into smaller particles and causing them to evaporate. More time would have allowed us to cool the water down and skim off the oil.

## Conclusions

Based on the results, what inferences can you make? The oil is less dense than the water since it floats on top.

Describe how your predictions were proven or disproven.

We hypothesized that we could separate the oil and water mechanically through a series of steps involving dipping, pouring, pipetting and filtering. We were successful with our separation, so it is possible to perform a small scale separation through mechanical means.

What were possible sources of error? We really did not experience any error, as we successfully separated oil and water

What questions arise based on your results? The main question is how we could scale our system up to actually separate oil and water on a larger scale. There are other techniques which would be more appropriate with larger scales including using a heat source to boil off the water or a large separatory funnel device which would leave the oil on top while the water could be drained below.